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ABSTRACT

This nine-week study examined the effect of the Accelerated Reader program on the reading comprehension scores of third grade students in a socio-economically disadvantaged area of West Virginia. Two separate third grade classes, with different teachers, but within the same school, participated in this study. The experimental group of students was encouraged to read and test on books supported by the Accelerated Reader program. The STAR Reading program was used to pretest and posttest students and the group scores were used to ascertain if significant growth in reading comprehension occurred in the experimental group. The data did show a significant difference that could be attributed to the Accelerated Reader program. Therefore, the hypothesis must be accepted: There will be a significant increase in reading comprehension scores after participating in the Accelerated Reader program. (Contains 30 references, and 5 tables and a figure of data.) (Author/RS)

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THE EFFECT OF THE ACCELERATED READER ON THE READING COMPREHENSION OF THIRD GRADERS

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Salem-Teikyo University

May 2000

U.S. DEPARTMENT OF EDUCATION
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This thesis submitted by Nancy E. Facemire has been approved meeting the research requirements for the Masters of Arts Degree.

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Abstract

This nine-week study examined the effect of the Accelerated Reader program on the reading comprehension scores of third grade students in a socio-economically disadvantaged area of West Virginia. Two separate third grade classes, with different teachers, but within the same school, participated in this study. The experimental group of students was encouraged to read and test on books supported by the Accelerated Reader program. The STAR Reading program was used to pretest and posttest students and the group scores were used to ascertain if significant growth in reading comprehension occurred in the experimental group. The data did show a significant difference that could be attributed to the Accelerated Reader program. Therefore the hypothesis must be accepted: There will be a significant increase in reading comprehension scores after participating in the Accelerated Reader program.

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CHAPTER 1

Introduction

Educators have often looked for tangible ways to reward and encourage the desired behaviors of their students while evaluating students' progress. Reading instruction is no different. This research explores the effect of Accelerated Reader, sometimes referred to as AR, a computerized reading management program, on the reading comprehension scores of third graders. This is the highest grade level of students participating in the Accelerated Reader program available to the researcher.

Defining Accelerated Reader and STAR

The Accelerated Reader program is a computerized task-level learning system for the management of literature-based reading. Its goal is to increase reading practice for the student, while giving the teacher information about the books read and the comprehension level attained by the student. The reading level of each book included in Accelerated Reader is calculated according to the Flesch-Kincaid readability index. The book is then assigned a maximum "AR Point Value," derived from its length and reading level according to the following formula: AR Points = (10 + Reading Level) x Words in Book divided by 100,000 (Advantage Learning Systems, 1999). The testing produces a combination of test scores and points earned, and gives the teacher a quick, efficient way to track student progress. AR is currently used in over 42,000 schools and over 22,000 book quiz titles are available in all grade levels. It is the most widely used computerized reading management program in this country (Advantage Learning Systems, Inc., 1999).

The Accelerated Reader program operates in three basic steps. First, the student selects a book from the AR list. Second, the student reads the book. And finally, the student takes a computerized test on the book read. The computer scores the test and records the points earned by the student. Books are assigned point values in regard to reading difficulty and length. The point value of each book is printed on the book to encourage students to select increasingly harder reading material. Two important types of feedback are provided to the teachers by AR, which helps them direct student reading effectively. First, the reading level assigned each book is comparable to all texts, and second, the percentage score achieved by a student measures how well the student comprehended the book (Institute for Academic Excellence, 1997).

The use of extrinsic rewards is not a vital part of Accelerated Reader. The feedback provided by the program serves as an important record of achievement and skill to be used by the teacher, parent, and student. Motivation to participate in reading is one of the major goals of AR. The points students earn for taking Accelerated Reader tests are more a measure of reading practice rather than extrinsic motivation (Institute for Academic Excellence, Inc., 1997).

The STAR Reading program was used to assess students' reading comprehension before and after the study. The questions in STAR Reading continually adjust to each student's responses. Generally, the test takes 10 minutes to administer and the results of the testing are immediately available. Teachers can use the reports to help students select books with

appropriate reading levels and measure student growth in reading achievement throughout the year.

Importance of Research in Reading

Educators agree that learning to read is one of the most important goals of early elementary education; teachers and principals must provide the environment for literacy to occur (Ediger, 1998). Selecting a book, reading and comprehending what is read, becomes a necessary and very realistic objective, while a genuine love of reading is the ultimate life goal.

Determining what methods and instructional approaches work best in reading education is a complicated and sometimes emotional problem. In response to this debate, the United States Congress has established a National Reading Panel (NRP) to review the current research, determine the effectiveness of instructional approaches, look at how these approaches translate into practice, and determine the need for future research. The NRP's purpose is to decide, on the basis of research, which reading instruction methods create the most literate students (Shanahan, 1999). Although the NRP's report has not been published at this time, its very existence underscores the importance of research in the field of reading instruction.

Research Question

The question directing this study concerns the effect that the Accelerated Reader program has on the reading comprehension of third grade students. It is assumed, for the purpose of this study, that computerized testing is a valid way of gathering information on

students' reading comprehension. It is also assumed that the STAR Reading program is a reliable and valid method of establishing a grade level equivalent score for students' reading comprehension.

Definition of Terms

Accelerated Reader Program- A computerized task-level learning information system for the management of literature-based reading; introduced in 1986 by Advantage Learning Systems, Inc.

Reading achievement- A measure of progress in the ability to read and understand printed material.

Reading comprehension- The ability to recognize words in context and understand their meaning; ability to understand what is read.

Socio-economically disadvantaged- Students eligible for free or reduced-price lunch or other public assistance.

S.S.R.- Sustained silent reading

STAR Reading Test- A computerized norm-referenced reading test that provides grade equivalents, percentile scores, and instructional reading levels for students; published by Advantage Learning Systems, Inc.

Title I- A federally funded government program whose funds are intended to help close the achievement gap between high- and low-poverty schools by targeting additional resources to school districts based on the number of poor school-age children.

The Accelerated Reader program was selected for study based on the needs of increasing the reading con prehension of students, motivating students to read, incorporating the available computer technology into the language curriculum, and monitoring student progress and achievement. This study evaluated the effect of the Accelerated Reader program on the reading comprehension scores of 15 students in a third grade classroom, for a nine-week period. The limitations include the length of the study, the small number of students available to the researcher, and the objectivity of the researcher, who was both investigator and experimenter in this study.

CHAPTER 2

Literature Review

Perspectives on Research in Reading

Dr. Marlow Ediger (1998) ascertained that technology provides new avenues for students to engage in exciting reading curriculum and provides more efficiency in the process. The overall goal in reading instruction is to guide students into personal enjoyment of books, while providing them with the skills to read for utilitarian purposes (i.e., informational reading). Students need to do much reading, with guidance, to achieve these objectives. Identifying words and reading fluently is important so that comprehension can be obtained (Ediger, 1998).

Manning-Dowd (1987) reviewed the research on sustained silent reading (SSR) and concluded that most researchers agree that SSR has a positive effect on reading comprehension and attitudes about reading, at all grade levels. The research was less conclusive on the effect of SSR on elevating the students' grade level in reading. Six of the studies considered found SSR to have a significant positive effect on students' reading scores, and five studies showed no significance in improvement of scores. Manning-Dowd concluded that SSR positively influences reading achievement, but many of the benefits are long-range.

Positive Effects of Accelerated Reader

Turner (1993) identified underachieving sixth through eighth grade students by comparing their anticipated and actual national percentile scores on the Comprehensive Test of Basic Skills (CTBS) and the Test of Cognitive Skills (TCS). Students' reading behavior was identified and documented by surveying students, accessing school library circulation records, and administering the Estes Scale of Reading Attitudes. It was determined that reading was not a priority interest of the underachieving students. Intervention strategies introduced included the Accelerated Reader program, sustained silent reading, public library membership campaign, home reading contract, read-aloud program, and a novel-based reading curriculum. The increased reading activity improved reading comprehension, but results were not conclusive in regard to improving reading attitudes.

Fifth grade students were the subjects in a study by McKnight (1992) aimed at using Accelerated Reader and other strategies to improve reading attitudes. The 17 students in the study were not interested or motivated to read, and television occupied a great deal of their out-of-class time. Interventions involved encouraging parents, teachers, and media specialists to provide interesting reading material, model a love for reading and read aloud to the students. The AR program was introduced to provide motivation for reading books. Points earned, after reading and correctly answering test questions, were traded for prizes. Additional activities included a student daily reading log, read-aloud sessions, poster contests, and daily, sustained silent reading periods. Results were measured by comparing a

pre- and post-TV survey of the students, reviewing students' reading logs, library circulation records, reading goals, observation survey of sustained silent reading periods, student questionnaires, and student improvement on tests. At the conclusion of the study, results showed no significant reduction in students' television viewing time, but their attitudes toward reading improved and students did read more.

Topping and Paul (1999) explored the relationship between reading practice (time spent on task at reading), student reading performance, and organizational features of the school system. Data gathered through Accelerated Reader was used as a measure of reading practice for more than 659,000 students in kindergarten through grade 12; students and states were compared. Student reading ability had a strong positive relationship to the amount of reading practice performed in school. In states where test results indicated higher than average reading performance, students also had greater amounts of in-school reading practice. Schools using AR for longer periods showed higher rates of reading practice. Schools in the study used AR as a supplement to the regular reading curriculum; only a very few schools had attempted to implement the AR recommendation of 60 minutes of sustained silent reading per day, in class. Increases in time students spent reading occurred out of class.

Increasing the amount of time students engage in sustained silent reading (SSR) is a goal of Accelerated Reader, which applies the findings of Patterns of Reading Practice, by Terrance D. Paul (1996). Paul conducted a large-scale study, with 659,214 students in grades K-12. He found the average reading practice per day, for these students, was 7.1

minutes. Paul's data indicated that students who had greater amounts of reading practice experienced higher achievement in all subject areas. His study also contained data that indicated students in schools using AR one year or less averaged less than 10 minutes per day reading practice, while students in schools using Accelerated Reader 4 years or more, averaged more than 28 minutes per day in reading practice. The data suggests that AR is an effective tool in stimulating increased independent reading.

Paul's (1996) data indicate that AR had greater success in urban schools, and in areas of low socio-economic environments. Schools owning AR also showed significantly higher attendance rates than the control group. Students in schools owning AR performed better in all subject areas, including reading, writing, mathematics and science, when compared to their peers in socio-economically comparable schools (Paul, Swanson, Zhang, & Hehenberger, 1997). Academic performance increased with the length of time the schools owned AR, and academic performance was not affected by the availability of computers within the school. The study provided compelling data to support the use of AR, and concluded that AR has a positive effect on student achievement.

Paul (1992) conducted a large-scale study of Accelerated Reader with test data from 4498 students, aged 6 to 16, in 64 schools. The research indicated a strong correlation between points accumulated in the AR program and gains in reading test scores. In a 1993 study, Paul examined data from 10,124 students in first through ninth grade from 136 schools, and using 12 different standardized tests. Results again indicated a positive relationship between reading achievement, and points accumulated in AR. Math scores also

increased for the same students. Younger and lower achieving students appeared to improve more than the older, more able readers.

Peak and Dewalt (1993) examined the effect of AR on reading achievement of middle school students. Subjects for the study were college-prep freshmen from two junior high schools, Cherryville and Grier, in Gaston County, North Carolina. Reading scores from the third, sixth, and eighth grade cumulative records were compared. The groups were similar in demographics and curriculum expectations. In third grade, Cherryville students had a lower mean total CAT (Children's Assistance Trust) score than Grier students. The Accelerated Reader program was implemented at Cherryville, and by the eighth grade Cherryville students had a higher mean total CAT score than Grier students. Results indicated that AR had some direct positive effect on the students' reading scores over a five-year period.

Paul, VanderZee, Rue, and Swanson (1996) studied the correlation between school ownership of Accelerated Reader and scores on statewide-standardized tests. The Institute for Academic Excellence, publishers of the Accelerated Reader and STAR Reading programs, conducted this large-scale study. The objective was to determine if Accelerated Reader has a measurable effect on academic achievement and school attendance rates. The Accelerated Reader and STAR programs helps teachers motivate students to read more books, and enables the teacher to evaluate, monitor, and record student progress. The programs provide continual assessment and accountability for literature-based reading. The research compared the scores in five curricular areas for elementary, middle, and high

school students. Approximately 2500 AR-owning schools were compared to 3500 schools that did not own AR. Schools were matched for socioeconomic status. The AR schools performed statistically better at all levels, except sixth and tenth grades, than did their non-AR counterparts. Urban and low socio-economic areas showed greater positive statistical significance in test scores than other areas. Attendance rates were also positively affected, and hardware ownership was determined not to be a factor. The research findings suggest that Accelerated Reader has a positive effect on students' academic performance, and that AR is an effective motivator in increasing reading practice. It was determined that increased reading led to greater academic success and higher attendance rates.

Accelerated Reader has shown to be an effective tool for motivating and positively enhancing reading achievement in severe socio-economically disadvantaged areas (Vollands, Topping, & Evans, 1999). The research suggested AR yielded significant gains in reading achievement among at-risk readers. Reading attitudes were also positively influenced, especially among girls. Teachers in this study were given one day of training before implementing AR. Use of the program improved with time, but less time was devoted to sustained silent reading in the experimental classes than in other classes. The study suggested that AR improved the quality of students' contact with literature and was effective without extrinsic rewards.

A study conducted in Scotland evaluated the effects of computer-assisted self-assessment on reading comprehension and motivation to read (Vollands; Others, 1996). The study was conducted as an experiment to evaluate the Accelerated Reader program.

The objectives were to explore whether significant gains would be made in reading achievement and attitudes that could be attributed to AR. The Accelerated Reader was used in the research to provide assessment of reading comprehension. Students from two schools were involved in the study; the students read from a list of 150 titles supported by AR. The data indicated that students using Accelerated Reader had greater gains in reading comprehension than students in a control group, and also greater gains than students in an alternative experimental program who did not use the program. There were also significant differences in attitudes and motivation to read for boys and girls.

Penuel (1997) studied data from 19 elementary schools in a metropolitan area that had used Accelerated Reader for two years. When actual gains were compared to expected gains, students in third and fourth grades exceeded expectations in reading and language. Language gains were statistically significant, while reading gains were not.

Not all studies agree that AR makes a significant difference in reading achievement. Mathis (1996) examined the effect of Accelerated Reader on the reading comprehension scores of sixth grade students, compared to their fifth grade year when they did not use the program. The study used scores from the Stanford Achievement Test (SAT). Subjects for the study were 30 sixth grade students from a rural farm community in Illinois. The students' raw scores in reading comprehension from the fourth, fifth, and sixth grade SAT scores were used in the study. Results indicated that there was no significant increase in reading comprehension from the fifth to sixth grade year, for the students using Accelerated reader, that could be attributed to AR.

Advantages and Disadvantages of Accelerated Reader

Poock (1998) examines the strengths and weaknesses of the Accelerated Reader program and describes how two elementary schools have used it to best advantage. The start up package for AR software is available for approximately $400, but many schools spend an average of $1500 on software. The program can be installed on most computers and the company offers technical assistance over the phone. The AR tests require little or no assistance from the teacher. A test consists of 5 to 20 multiple-choice questions, depending on the difficulty and length of the book. The reports generated by AR are concise and helpful in identifying at-risk students who are not succeeding. The teacher can intervene and give attention to students needing special help. Successful students are encouraged by receiving good scores on tests and are anxious to continue participation. However, the tests do not probe higher order thinking skills. Furthermore, the students may not learn to love good literature and the experience of reading if they are too focused on test taking.

The educators at the elementary schools discussed by Poock (1998), which successfully used Accelerated Reader, suggest AR books be shelved with the books in the library and not separated from the available literature. Teachers monitor the books selected by the students, and make appropriate suggestions. Reading for pleasure is modeled in the classroom and encouraged by the teacher. Testing on the books is secondary. Students are rewarded for their reading success with books, not toys or trinkets. AR is used as a tool within the program and is not the basis of the reading

curriculum. Following these guidelines, the Accelerated Reader program rewards the students intrinsically and extrinsically. Many students enjoy taking the tests on a computer and are encouraged to read more books. The more students read, the better readers they become. Self-esteem is increased when they are successful at passing tests. Students can see their own growth and reading improvement. Accelerated Reader can benefit students of many different abilities and grade levels. Students become better readers and therefore better students, because of their increased reading practice.

McKnight (1992) found that the use of Accelerated Reader combined with sustained silent reading in the classroom, keeping daily reading logs, read-aloud sessions, and poster contests did positively affect students' attitude toward reading. Knox (1996) compared the affects of the AR program to a teacher-directed program and found that both increased students' comprehension and vocabulary. Independent reading was determined to be the contributing factor to each program's success, and not the method of delivery.

Good Implementation of Accelerated Reader

Teachers play a major role in the effectiveness of the Accelerated Reader program. In two separate reports, Topping (1999), and Sanders and Topping (1999), suggest several characteristics of good implementation:

- Have students read as much as possible, guiding them to appropriate books
- Monitor student progress
- Ensure students' percentage of correct answers is 85 percent or higher
- Generate and study at-risk reports

- Intervene when above goals are not being met – especially with low ability students
- Increase the challenge level gradually
- Monitor book selection to insure challenge is appropriate
- Teachers should be trained in implementation
- Participation must be voluntary for students
- A large selection of AR books should be available for students to choose from
- Books should be coded for readability to enable students to manage challenge on their own
- Extra opportunities for reading practice should be provided at school and encouraged at home and in the community
- Student access to computers for the purposes of AR test taking should be easy, frequent, and immediate
- Students should be encouraged to reflect on the implications for action provided by the feedback they receive, with self-management encouraged
- Less able readers should be permitted to test on books read to and with them, as should their peer helpers
- Parents should be aware of the program, regularly receive AR reports from the school and respond to them, and be encouraged to ensure that their children have opportunities to read at home
- Peer tutoring should be incorporated, in support of reading, testing, or both

- Extrinsic rewards should be used only if necessary, effective, and culturally appropriate, and then the rewards offered should be books or reading-related items
- Re-testing should be allowed only in exceptional circumstances

Disadvantages of Computer-based Managing Systems in Reading

Accelerated Reader encourages schools to initiate school-wide reading projects with goal setting and tangible rewards. Some schools award prizes to students as AR points are accumulated. However, these practices are sometimes criticized. Dr. Betty Carter of Texas Woman's University (1996) identifies seven problems associated with rewards and computer managing systems for literature based reading programs.

1. Reading is devalued when rewards are given. In life, rewards are often incentives for performing less desirable tasks. When rewards are given for reading, educators are reinforcing the idea that reading cannot stand alone as a pleasurable experience.
2. Tangible rewards diminish motivation (Kohn, 1993). The focus is on the reward, instead of the reading experience. This misplaced motivation will result in diminished interest in reading. When the extrinsic rewards are gone, so is the motivation to read.
3. Use of the programs limits title choice for students. Students may choose to read only books that reward them with points. The reading selection in AR is heavily weighted with fiction. Poetry collections do not appear on the list, nor do many

highly visual books. Informational, non-fiction books are under-represented as well.

4. Collection development and materials selection become tied to the reading management program. Start-up costs of AR begin at $400, depending on how much is purchased. Schools that purchase these programs must also purchase the books that accompany them, if the titles are not already available in the school library.
5. Children do not develop the skill of selecting books. The role of the school librarian is to provide access to a wide range of material and to advise readers on the material available. If children read for the sole purpose of gaining points, they will choose books accordingly and will not practice the selection processes (favorite authors, genre, etc.) that translate into life-long readers.
6. Testing rather than independent needs motivates the reader. Children read in different ways. In efferent reading, the child looks for what he or she can take from the book. In aesthetic reading, the child wishes to experience the book (Rosenblatt, 1959). Life-long readers read aesthetically, they empathize with the characters and/or experience a new time or place. An emphasis on testing promotes the idea that there is only one way to read a book, and so, personal response is lost.
7. The school's resources could be better used. The monetary cost of programs such as AR limits the available resources for other educational investments.

Computers could be used for learning in real-world applications, rather than the multiple-choice tests offered by AR. Book selection would be based on reviews and collection needs, and not dictated by AR.

School libraries and media centers must promote independent reading and learning. Students must learn how to select materials for pleasure reading, for research, and to seek information about their own questions. The school librarians need to help students learn to evaluate and disseminate information found in print and non-print materials. These goals must not be sacrificed in order to promote and manage motivational systems and to reward students who recall factual information about the book they just read (Carter, 1996).

Computerized reading-management programs have replaced book reports in many schools. Some educators and students love this high-tech way of making sure books are read and understood. Others are concerned that the programs offer limited choices and require the books to be read with comprehension as the primary goal, rather than enjoyment (Everhart, 1998). Everhart (1998) reports that reading-management programs have existed since 1981 when a library media specialist in Indiana, Rosalie Carter, and her husband, an instructional designer, developed a computer program they called Electronic Bookshelf (EB). This program allowed students to select a book from a list and after reading it, take a multiple-choice test on the book. The computer scored the tests, awarded points, and kept records for the teacher. Information was immediately available to both the student and the teacher. Electronic Bookshelf was a great success, and so other companies began developing similar programs. Accelerated Reader now claims the largest part of the market and

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provides users with technical support and seminars on setting up, running the program and integration into the existing curriculum. Accelerated Reader also has its own research institute that sponsors studies.

Prince and Barron (1998) identified several issues related to the discussion of computerized reading management systems. The current trend to supplement reading instruction with programs such as Accelerated Reader is propelled by the educational community's search for innovative methods to improve students' reading comprehension on standardized tests. Educators are also interested in creating lifelong learners and readers, as well as fostering a genuine love for reading. Success in reading is a primary objective for all educators, and especially for elementary teachers. Computers are available in nearly all classrooms, and educators are eager to implement the available technology into the curriculum and learning environment. An additional concern (Coles, 1999) involves the emotional response that may be lost in reading if the student is overly concerned about testing on the content of a book. Educators must be aware of the connection between cognitive and emotional, and how that connection affects thinking and learning for students.

Educators cannot rely on computerized programs alone to guide book selection and dictate reading environment. Students must be exposed to literature from many genres and must experience meaningful reading and writing across the curriculum. Teachers must demonstrate to students their own high values on reading for pleasure and information, and set a good example for students to follow. Parents and the community must be supporters of reading (Prince; Barron, 1998).

Enabling Students to Become Successful Readers

Indiana Middle Grades Reading Network published the "Reading Bill of Rights for Indiana's Young Adolescents." They declared that all students need access to reading opportunities that will allow them to grow up to be successful members of society; it is everyone's responsibility to offer support for providing these opportunities; the ultimate goal of reading education is to create Communities of Readers where each student can fulfill his or her potential and experience the joy of reading; and all students have certain inalienable Reading Rights:

1. Success as a Reader. Every child is capable of learning to read and to enjoy reading.
2. Access to appropriate books. Appealing books for a wide variety of interests, covering all reading levels, must be available.
3. Time to read. Reading must be practiced. School must provide time during the school day to read for pleasure, for information, and for exploration.
4. Read-aloud experiences. All children must have regular opportunities to hear books read aloud. At early ages, reading aloud introduces them to the magic of print. As they grow, read-aloud encounters stretch their vocabulary, introduce them to new ideas, and demonstrate to them that adults value reading highly.
5. Time for book discussions. Discussing books is one of the strongest ways to build Communities of Readers, and to develop students' thinking skills.

Schools must make time for book discussions between teacher and students, and also among students sharing books they have enjoyed.

6. Reading role models. In Communities of Readers, all adults, in school, at home, and across the community, show by example how they value reading and guide young people to make reading a priority in their lives.
7. Literacy-rich environments. Everything in students' surroundings must show that books and reading are valuable, from the presence of books in the classroom and open access to the library, to community events celebrating reading.
8. Library support. Libraries must not be just storage places for books. They must be dynamic places providing services specifically designed to engage young people's interest in reading.
9. Family support. Parents, grandparents, and other family members must be encouraged to involve themselves in reading to and with their children.
10. Community support. Programs involving all adults, not just parents, must be developed to give the community meaningful ways to be involved with reading development. Funding books and events, and giving time for tutoring activities are ways that individuals and businesses can make a contribution.

These Reading Rights have been adapted from Indiana Middle Grades Reading Network's "Reading Bill of Rights for Indiana's Young Adolescents" and previously

published in Patterns of Reading Practice, by Terrance Paul (1996). Paul is the Chairman of The Institute for Academic Excellence, Inc. and co-developer of Accelerated Reader.

Many studies have documented Accelerated Reader's effectiveness in getting students to read more. Labbo (1999) raises the issue of looking at how Accelerated Reader is used, rather than if it is used. Four areas of concern to educators must be addressed when evaluating the effectiveness of AR:

- Raising standardized test scores
- Incorporating computers into the language curriculum
- Fostering higher order thinking skills
- Encouraging a love of reading for literate, lifelong readers

The objective of this present study was to determine whether participation in the Accelerated Reader program, for a nine-week period, would affect the reading comprehension scores of third graders. The extrinsic rewards were limited to bookmarks and paperback books, and the report generated by Accelerated Reader and printed by the student. The report detailed the reading level and point values of each book the student read and the scores achieved on the test. Accumulated scores were also given on the report. A certificate to redeem for a book was given when the student met a goal established with his or her teacher. Students who receive book certificates as rewards for reading achievement show greater gains than those receiving other incentives (McLaughlin, 1975). The researcher hypothesized that third grade students, using Accelerated Reader for a nine-week

period, would show a greater increase in reading comprehension scores than their peers, who were not participating in the Accelerated Reader program.

CHAPTER 3

Method

Participants

Approximately 40 third grade students attending a rural public school, in north central West Virginia participated in the study. Two separate third grade classrooms, with individual teachers, but within the same school, were selected for this research. Sixty percent of these students had been identified as socio-economically disadvantaged by Title I standards, that is, they were eligible for free or reduced-price lunch or other public assistance. For the purpose of evaluating reading comprehension, all students in the sample were able to read and complete the STAR Reading comprehension tests, independent of teacher and classmates. All students in the study received instruction in regular third grade education classrooms. None of the students were members of an ethnic minority.

At the beginning of the study, the experimental group (Accelerated Reader program participants) consisted of 10 boys and 7 girls. At the conclusion of the study, pre- and post-test data gathered from two students in the experimental group, one boy and one girl were discarded because the students had chosen not to participate in any way with the Accelerated Reader program. These two students had scored below grade level on both the pre- and posttest, and were among the lowest scorers in their class. They had not earned any points in AR because they had not passed any of the computerized tests. Only data from the 15 students actually reading and engaged in the AR testing were used in the statistical analysis and *t* tests. The control group consisted of 12 boys and 9 girls.

Materials

The STAR Reading comprehension test (Advantage Learning Systems, 1999) was used to assess students' reading level before and after the study. The STAR Reading test is a computer program using multiple-choice questions, which continually adjusts to each student's responses and typically takes 10 minutes to administer. Results are immediately available which provide grade equivalents, percentile scores, and instructional reading levels. The STAR Reading test mirrors the look and procedures of the Accelerated Reader tests.

The Accelerated Reader program was purchased for the school with Title I funds. It is a computerized task-level learning system for the management of literature-based reading. Its goal is to increase reading practice for the student, while giving the teacher information about the books read and the comprehension level attained by the student. The reading level of each book included in Accelerated Reader is calculated according to the Flesch-Kincaid readability index. The book is then assigned a maximum "AR Point Value," derived from its length and reading level according to the following formula: AR Points = (10 + Reading Level) x Words in Book divided by 100,000 (Advantage Learning Systems, 1999). The testing produces a combination of test scores and points earned, and gives the teacher a quick, efficient way to track student progress. AR is currently used in over 42,000 schools and over 22,000 book quiz titles are available in all grade levels. It is the most widely used computerized reading management program in this country (Advantage Learning Systems, Inc., 1999).

The Accelerated Reader program operates in three basic steps. First, the student selects a book from the AR list. Second, the student reads the book. And finally, the student takes a computerized test on the book read. The computer scores the test and records the points earned by the student. Books are assigned point values in regard to reading difficulty and length. The point value of each book is printed on the book to encourage students to select increasingly harder reading material. Two important types of feedback are provided to the teachers by AR, which helps them direct student reading effectively. First, the reading level assigned each book is comparable to all texts, and second, the percentage score achieved by a student measures how well the student comprehended the book (Institute for Academic Excellence, 1997).

Students selected books from the school library media collection, which includes more than 800 books specifically designated as Accelerated Reader. The total library collection numbers 8000 books. The library media center and the librarian were available each school day for circulation of books and to assist students in selecting reading material. The Accelerated Reader software, installed on computers in the classroom, was used to quiz the experimental group after they completed a book.

Design and Procedure

Two third grade classrooms were randomly selected for this study. Students in both groups were tested individually using the STAR Reading comprehension test on computers in the library. The first random classroom was the experimental group. This group was introduced to Accelerated Reader and instructed in the use of the software. Students were

encouraged to read books that were included in the Accelerated Reader program. The students were not limited in any way in their book selection or required to read and test on identified books. Student participation in Accelerated Reader was voluntary, as recommended by Topping (1999) and Sanders and Topping (1999). Accelerated Reader software compiled a list of books and reward points for each student as he or she read and completed tests. This information was available each time the student accessed the program.

Implementation of Accelerated Reader closely followed the guidelines suggested by Topping (1999), and Sanders and Topping (1999). Students were given as much time as possible, at least 20 minutes a day, to read silently in class. Students were guided to appropriate reading materials during regularly scheduled library visits, eighty minutes per week, and were given time to read and discuss literature. Teachers were trained in implementation of AR during mandatory staff development and continuing education sessions. Students had access to a large selection of AR books: over 800 books were added to the school library collection and marked as Accelerated Reader books. Books were available for check out each day in the library media center, and classroom book collections were also used.

Students had frequent, and immediate access to computers located in their third grade classrooms to test on the AR books. Each class had 5 computers per 20 students. Extra opportunities for reading practice were provided at school and encouraged at home and in the community. Bookmarks and paperback books were used as extrinsic rewards for meeting goals.

The second random third grade served as the control group. They were not introduced to Accelerated Reader except through the STAR Reading comprehension test, but they also had access to the entire library media collection each school day, including books designated as Accelerated Reader.

Both groups were exposed to the regular third grade curriculum in the classroom, book talks and read-aloud sessions in the media center, and 20 minutes of sustained silent reading time each day in their classroom. Both groups participated in school-wide reading events, such as after school reading tutoring, provided by Title I, and Read-Aloud America!, an after school program staffed by college students and monitored by teachers. Other scheduled events were book fairs, book talks, Friday night family reading events, visits from local authors, and a goal of 2000 books to be read by all students (to celebrate the year 2000).

The study ran for nine weeks, one grading period. At the conclusion of the study, individual students in the two sample groups were once again tested using STAR Reading comprehension test software. It was hypothesized that third grade students using the Accelerated Reader program will show a greater increase in reading comprehension than their peers not participating in the Accelerated Reader program.

CHAPTER 4

Findings and Discussion

Description of Findings

This nine-week study examined the effect of the Accelerated Reader program on the reading comprehension scores of third graders. The experimental group of students was encouraged to read and test on books identified as part of the Accelerated Reader program. However, the students were not limited in any way in their book selection or required to read and test on identified books. The students' participation in Accelerated Reader was strictly voluntary. This procedure is recommended and discussed by Topping (1999) and Sanders and Topping (1999). Eighty-nine percent of students in this experimental group chose to read Accelerated Reader books and participated in the computerized testing after reading AR supported books.

The STAR Reading program was used to pretest and posttest both the experimental group (AR users) and the control group. The STAR Reading program compiled a score of reading comprehension, for each student, and converted the score to a grade level, as shown in Table 1 (see appendix). The resulting grade level score was used as raw data in this research. The pretest and posttest group scores were used to ascertain if significant growth in reading comprehension occurred in the experimental group, as compared to the control group. The researcher used a *t* test to find the mean of the pretest and posttest scores for both

groups of students, experimental and control, as detailed in Table 2 and Table 3, in the Appendix. It was discovered that the experimental group using AR did show a greater gain in reading comprehension compared to the students not using AR, the increase was statistically significant at a confidence interval of 95%.

A special *t* test for dependent means was used to compare the differences of the values of the pretest and posttest; data is show in Table 4 (see Appendix). After finding the mean of the differences and the standard deviation of the differences, a test value was established, details in Table 5, in the Appendix. The *t* distribution for this experiment was 2.145, degrees of freedom was 14, with a confidence level of 95%. The control group's test value was determined to be 1.33, well within the normal range. The experimental group's test value was 2.30, which was greater than the *t* distribution and therefore, statistically significant. This significance could be attributed to the Accelerated Reader program.

Discussion

This research focused on third grade students. Few researchers have looked at early elementary students' use of Accelerated Reader. Consequently, very little data exists in other studies to support the implementation of the AR program with young students. Most studies have looked at middle school students, perhaps because it is during the middle school years that reading for pleasure declines. This study has contributed to the knowledge and database for elementary students using Accelerated Reader and it is hoped that this research can be extended to even younger readers in a wider study of the effects of AR on reading comprehension scores.

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The original problem of determining the effect of the Accelerated Reader program on the reading comprehension of third graders begs for continued research. This study involved a small number of subjects, 15 students in the experimental group using AR, and 21 students in the control group who did not use AR. The control group made normal progress in reading comprehension, and the experimental group did see a greater increase when compared to the control group. The increase was statistically significant at a confidence level of 95% according to the *t* tests. Increases were also apparent when looking at the group mean scores. The students in the control group experienced a 9% increase in their group mean score in the nine-week period, while the students in the experimental group saw an increase of 17% in the same nine-week period.

Figure 1: Group Means and Percentage Increase

	Pretest group mean	Posttest group mean	Percentage Increase
Control group (non-AR users)	3.11	3.40	9%
Experimental group (AR users)	2.96	3.49	17%

In conclusion, this nine-week study, which examined the effect of the Accelerated Reader program on the reading comprehension scores of third graders, did provide statistically significant differences that could be attributed to AR. The study has added to the research by contributing data from third grade students, a group with little representation in

the literature review. The effect of the Accelerated Reader program on reading comprehension scores during a nine-week period looked impressive in the chart above, and when the *t* test was administered to the data, a significant statistical difference was apparent. However, this study needs to be replicated with a much larger student sample of third graders and the data collected for a longer period of time to increase the validity of the research.

CHAPTER 5

Summary and Discussion

This nine-week study examined the effect of the Accelerated Reader program on the reading comprehension scores of third graders. The data analysis of reading comprehension scores, comparing the two groups, demonstrated significant differences that could have been attributed to the use of Accelerated Reader. Therefore, the null hypothesis was rejected, and the hypothesis was accepted.

- Third grade students who use the Accelerated Reader program for nine weeks will show statistically significant greater gains in reading comprehension, when compared to their peers who do not use the Accelerated Reader program.

Gains made by both groups can also be attributed to the normal course of reading instruction. In addition, the review of literature indicated that students who were given extra opportunities to read and enjoy literature experienced long-term growth in reading comprehension and reading enjoyment.

The experimental group of students was encouraged to read and test on books identified as part of the Accelerated Reader program. However, the students were not limited in any way in their book selection or required to read and test on identified books. Participation in the Accelerated Reader program was strictly voluntary. Eighty-nine percent of students in

this experimental group of 17 chose to read Accelerated Reader books and participated in the computerized testing. At the conclusion of the study, pretest and posttest data gathered from two students in the experimental group, one boy and one girl were discarded because the students had chosen not to participate in any way with the Accelerated Reader program. Only data from the 15 students actually reading and engaged in the AR testing were used in the statistical analysis and *t* tests.

The STAR Reading program was used to pretest and posttest both the experimental group (AR users) and control groups. The STAR Reading program compiled a score of reading comprehension for each student, and converted the score to a grade level. The resulting grade level score was used as raw data in this research. The pretest and posttest group scores were used in *t* tests to compare the groups in the study.

A special *t* test for dependent means was used to compare the differences of the values of the pretest and posttest. After finding the mean of the differences and the standard deviation of the differences, a test value was established. It was discovered that the experimental group using Accelerated Reader did show a greater gain in reading comprehension compared to the students not using AR, the increase was statistically significant at a confidence level of 95%.

There are several areas in which the research could be extended. It is recommended to continue this study with a larger group of third grade students, and to increase the time between pretest and posttest. Very little data exists on the effect of computerized reading-management programs, such as Accelerated Reader, on the reading comprehensive and

achievement of third graders. While the present research did produce data with statistically significant differences, it can be assumed that results were less valid due to the small sample of students and the nine-week time limit. Small samples become the norm when teachers conduct research, and, as teacher- researcher, the classroom provides a readily available student population with which to conduct studies. Students are also very focused on achievement within the grading periods, so the nine-week study fit in with motivation for the grading schedule, although students did not receive grades for participating in Accelerated Reader. Increasing the size of the sample and lengthening the time period between pretest and posttest will increase the validity of the data collected.

Further study is also needed to address the importance of how Accelerated Reader is used with students of all grade levels. There is some evidence that how AR is implemented is more important than if it is implemented (Poock, 1998; Topping, 1999; Sanders and Topping, 1999), but research is lacking in this area.

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APPENDIX

Table 1. Pretest and Posttest (Grade Level Equivalents) and Mean Scores

Control Group (n=21)		*Experimental Group (n=15)*	
Pretest Scores	*Posttest Scores*	*Pretest Scores*	*Posttest Scores*
3.5	4.0	1.3	2.0
1.3	1.1	2.6	1.6
3.3	4.2	3.6	2.9
4.5	4.7	4.7	5.4
4.0	3.6	3.2	3.7
2.0	2.3	2.8	3.4
3.8	4.4	1.5	2.5
2.6	2.8	4.6	4.9
2.4	1.3	3.0	5.3
2.5	2.5	3.5	3.6
2.7	3.0	4.2	5.6
3.9	3.9	1.9	1.7
2.8	3.1	2.5	3.5
2.5	2.8	3.0	4.7
1.8	3.6	2.5	1.5
3.8	4.5		
2.7	3.2		
4.9	5.3		
3.1	3.2		
3.7	4.2		
3.6	3.6		
Sum 65.40	71.30	44.40	52.40
Mean 3.11	3.40	2.96	3.49

Table 2 Pretest Data

Control Group Scores			Experimental Group Scores		
X_1	X_1-m	$(X_1$-m$)^2$	X_2	X_2-m	$(X_2$-m$)^2$
1.30	-1.81	3.28	2.00	-0.85	0.72
2.40	-0.71	0.50	2.60	-0.25	0.06
2.00	-1.11	1.23	1.90	-0.95	0.90
2.50	-0.61	0.37	1.30	-1.55	2.40
2.50	-0.61	0.37	1.50	-1.35	1.82
2.60	-0.51	0.26	3.60	0.75	0.56
2.70	-0.41	0.17	2.80	-0.05	0.00
2.80	-0.31	0.10	2.50	-0.35	0.12
2.70	-0.41	0.17	3.50	0.65	0.42
3.10	-0.01	0.00	3.20	0.35	0.12
1.80	-1.31	1.72	3.00	0.15	0.02
3.60	0.49	0.24	4.60	1.75	3.06
4.00	0.89	0.79	3.00	0.15	0.02
3.90	0.79	0.62	4.70	1.85	3.42
3.50	0.39	0.15	4.20	1.35	1.82
3.30	0.19	0.04			
3.70	0.59	0.35			
3.80	0.69	0.48			
3.80	0.69	0.48			
4.50	1.39	1.93			
4.90	1.79	3.20			
Sum 65.40		16.45	44.40		15.50
Mean 3.11			2.96		
Variance 0.78			1.02		
s.d. 0.89			1.01		

t = 0.46

Table 3: Posttest Data

Control Group Scores			Experimental Group Scores		
X_1	X_1-m	$(X_1$-$m)^2$	X_2	X_2-m	$(X_2$-$m)^2$
1.10	-2.30	5.27	1.60	-1.65	2.72
1.30	-2.10	4.39	1.60	-1.65	2.72
2.30	-1.10	1.20	1.70	-1.55	2.40
2.50	-0.90	0.80	2.00	-1.25	1.56
2.80	-0.60	0.35	2.50	-0.75	0.56
2.80	-0.60	0.35	2.90	-0.35	0.12
3.00	-0.40	0.16	3.40	0.15	0.02
3.10	-0.30	0.09	3.50	0.25	0.06
3.20	-0.20	0.04	3.60	0.35	0.12
3.20	-0.20	0.04	3.70	0.45	0.20
3.60	0.21	0.04	4.70	1.45	2.10
3.60	0.21	0.04	4.90	1.65	2.72
3.60	0.21	0.04	5.30	2.05	4.20
3.90	0.51	0.26	5.40	2.15	4.62
4.00	0.61	0.37	5.60	2.35	5.52
4.20	0.81	0.65			
4.20	0.81	0.65			
4.40	1.01	1.01			
4.50	1.11	1.22			
4.70	1.31	1.70			
5.30	1.91	3.63			
Sum 71.30		22.29	52.40		29.68
Mean 3.40			3.25		
Variance 1.06			1.92		
s.d. 1.03			1.39		

t = 0.21

Table 4: Differences between Pretest and Posttest

	Control				Experimental			
	Pretest	*Posttest*	*Difference (D)*	$(D)^2$	*Pretest*	*Posttest*	*Difference (D)*	$(D)^2$
	1.30	1.10	-0.20	0.04	2.00	1.60	-0.40	0.16
	2.40	1.30	-1.10	1.21	2.60	1.60	-1.00	1.00
	2.00	2.30	0.30	0.09	1.90	1.70	-0.20	0.04
	2.50	2.50	0.00	0.00	1.30	2.00	0.70	0.49
	2.50	2.80	0.30	0.09	1.50	2.50	1.00	1.00
	2.60	2.80	0.20	0.04	3.60	2.90	-0.70	0.49
	2.70	3.00	0.30	0.09	2.80	3.40	0.60	0.36
	2.80	3.10	0.30	0.09	2.50	3.50	1.00	1.00
	2.70	3.20	0.50	0.25	3.50	3.60	0.10	0.01
	3.10	3.20	0.10	0.01	3.20	3.70	0.50	0.25
	1.80	3.60	1.80	3.24	3.00	4.70	1.70	2.89
	3.60	3.60	0.00	0.00	4.60	4.90	0.30	0.09
	4.00	3.60	-0.40	0.16	3.00	5.30	2.30	5.29
	3.90	3.90	0.00	0.00	4.70	5.40	0.70	0.49
	3.50	4.00	0.50	0.25	4.20	5.60	1.40	1.96
	3.30	4.20	0.90	0.81				
	3.70	4.20	0.50	0.25				
	3.80	4.40	0.60	0.36				
	3.80	4.50	0.70	0.49				
	4.50	4.70	0.20	0.04				
	4.90	5.30	0.40	0.16				
Sum	65.40	71.30	5.90	7.67	44.40	52.40	8.00	15.52
Mean	3.11	3.40	0.28	0.08	2.96	3.49	0.53	1.03

Table 5: Testing the Difference between Two Dependent Means

Degrees of Freedom: 14
Confidence Interval: 95%
***t* Distribution: 2.145**

	Control Non-AR Users	*Experimental AR Users*
Mean of the Differences	0.28	0.53
Standard Deviation of Differences	0.55	0.90
Estimated Standard Error	0.12	0.23
Test Value	**1.33**	**2.30**